

PATENT  
P57001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

TAE-SUNG KIM.

Serial No.: 10/766,564

Examiner: ERDEM, FAZLI

Filed: 29 January 2004

Art Unit: 2826

For: NOVEL CONDUCTIVE ELEMENTS FOR THIN FILM TRANSISTORS USED IN  
A FLAT PANEL DISPLAY

**INFORMATION DISCLOSURE STATEMENT**

Commissioner for Patents  
P.O.Box 1450  
Alexandria, VA 22313-1450

Sir:

In accordance with 37 C.F.R. §1.56, and §§1.97 and 1.98 as amended, Applicant cites, describes, and provides copies of the following art references. Under 37 C.F.R. §1.98(a)(2) however, copies of U.S. patent reference(s) are not provided.

**FOREIGN PATENT REFERENCES:**

1. Japanese Patent Publication No. 06-216263, to LEE, et al., entitled *FORMATION OF WIRING LAYER OF SEMICONDUCTOR DEVICE* published on 5 August 1994. (With English Abstract)
2. Japanese Patent Publication No. 2000-195948, to MIYAZAKI, entitled *SEMICONDUCTOR DEVICE AND ITS MANUFACTURE*, published on 14 July 2000. (With English Abstract)
3. Japanese Patent Publication No. 2003-031588, to TERAJIMA, entitled *MANUFACTURING METHOD FOR THIN-FILM SEMICONDUCTOR DEVICE, AND MANUFACTURING METHOD FOR DISPLAY DEVICE*, published on 31 January 2003. (With English Abstract)

**OTHER DOCUMENTS:**

- Japanese Office Action corresponding to Patent Application No. 2004-008469, issued on 29 May 2007.

**DISCUSSION**

According to the Japanese Office Action issued on 29 May 2007, corresponding to Patent Application No.2004-008469, **LEE, *et al.*, JP'263** discusses that a wiring-layer lower support film 23 is formed on a semiconductor substrate 21. Then, hydrotreating processing is performed to expose the lower support film 23 to hydrogen plasma and hydrogen radicals, and a surface part 26 of the lower support film 23 is hydrogen-terminated. After the hydrogen termination, a first conductive layer 27 is formed on the lower support film 23 by vapordepositing first conductive material on the lower support film 23. In this case, the lower support film 23 is an insulating film including an opening. The opening is a tapered contact hole 24 electrically connecting the wiring layer to an impurity doping region. The size of the contact hole 24 is represented by an average diameter value of the tapered contact hole. By the hydrotreating on the lower support film 23, wettability between the deposited metal layer and the lower support film 23 is improved.

**MIRAZAKI, JP'948** discusses that a first barrier film 9a, a second barrier film 9b, and a first conductor film 10a are sequentially deposited through sputtering method from the bottom as the underlying layers for a plated Cu film. The film 9a is comprised of a TiN film containing 30 at.% or higher of nitrogen, and the film 9b is comprised of a Ti film containing about 10-30 at.% of nitrogen. Furthermore, the film 10a is comprised of a Cu film. A second conductor film 10b is formed by the same method as that for the film 10a. Then, a first metal film 12a and a second metal film 12b are deposited on the films 10a and 10b, respectively. With this arrangement, the coagulation of Cu can be suppressed.

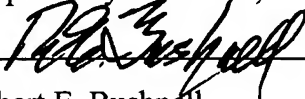
**TERAJIMA, JP'588** discussed that a connection hole 8, which reaches a silicon thin-film layer 3 of the thin-film transistor 6, is formed in a 2nd insulation film 4 and on the 3rd insulation film 7, a 3rd insulation film 7 covering the thin-film transistor 6 formed on a substrate 1 and a titanium-based material film 11 is formed, covering the internal wall of the connection hole 8. Then a nitride film 12 is formed, by nitrifying the titanium-based material film 11 from the top-surface side, by carrying out heat treatment in a nitrogen gas atmosphere. At this time, hydrogen gas is added to the nitrogen gas atmosphere, and the heat treatment is carried out; then a wiring material film is formed on the nitride film 12 and patterned so as to form a wire 15.

Pursuant to 37 CFR §1.97(d), the undersigned attorney hereby certifies that each item of information contained in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign patent application not more than three (3) months prior to the filing of the statement.

The citation of the foregoing references is not intended to constitute an assertion that other or more relevant art does not exist. Accordingly, the Examiner is requested to make a wide-ranging and thorough search of the relevant art.

No fee is incurred by this Statement.

Respectfully submitted,



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Folio: P57001 Date: 7/17/07 I.D.: REB/ty



**INFORMATION DISCLOSURE STATEMENT**  
**PTO-1449 (PAGE 1 OF 1)**

SERIAL NUMBER 10/766,564

DOCKET NO. P57001

APPLICANT TAE-SUNG KIM

FILING DATE 29 January 2004

GROUP 2826

**U.S. PATENT DOCUMENTS**

EXAMINER	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE

**FOREIGN PATENT DOCUMENTS**

**TRANSLATION**

	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	YES	NO
	JP06-216263	08/05/1994	JAPAN			Abstract	
	JP2000-195948	07/14/2000	JAPAN			Abstract	
	JP2003-031588	01/31/2003	JAPAN			Abstrac	

**OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, etc.)**

	Japanese Office Action corresponding to Patent Application No. 2004-008469, issued on 29 May 2007.

EXAMINER:

DATE CONSIDERED:

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP §609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.